MANITOBA FORESTRY

Manitoba
Natural Resources

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THE FORESTRY BRANCH

SEVENTH ANNUAL REPORT

1989 - 1990

MANITOBA NATURAL RESOURCES

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BRANCH & DEPARTMENT ANNUAL REPORT FOR THE YEAR ENDING MARCH 31, 1990

- *The mission of the Forestry Branch is to ensure sustainable development of provincial forestry resources for present and future generations of Manitobans.*

- *The Branch supports and promotes forest harvesting and manufacturing through long-range planning and forest-management efforts to optimise the use of forest resources, sustain and enhance the existing industry, and to assist in the establishment of new industries.*

- *The Branch administers* The Forest Act *and* The Dutch Elm Disease Act*; develops, implements and evaluates commercial harvesting plans for Manitoba's forests; administers timber-cutting licensing and measurements; plans and co-ordinates reforestation and forest stand tending; maintains a forest inventory; and develops and implements forest protection programs, including the control of Dutch elm disease.*

Specific objectives of the Forestry Branch include:

- *To ensure that the Crown owned forest land base is managed to provide an adequate resource base for existing and future harvest operations and an adequate forest cover for conservation of land resources.*

- *To manage the elm population in urban centres in the Province to lessen the impact of Dutch Elm Disease.*

- *To prevent widespread tree mortality and timber losses by providing a level of forest protection commensurate with the values at risk.*

- *To manage and allocate forest resources in a manner which attempts to optimize the long-term social and economic benefits to Manitobans.*

- *Ensures that all forest harvesting operations are performed in a manner which minimizes losses and environmental damage.*

- *To allow other resource use opportunities within designated forestry lands where the opportunities complement and do not conflict with existing or future forest harvesting operations.*

- *To ensure that forest resources are managed and utilized on a sustained yield basis.*

- *To ensure that silvicultural and regeneration measures are developed and implemented in order to maintain or improve the standing supply of timber.*

- *To ensure that the Crown obtains a fair return for the use of its forestry resource.*

INTRODUCTION

The year ending March 31, 1989 marked the close of the Five Year Canada/Manitoba Forest Renewal Agreement that contributed significantly to the enhancement of forestry and forest management in Manitoba. In particular, the five year agreement saw contributions on the part of both the Federal Government and the Province of Manitoba towards the promotion of reforestation and forest renewal programs. It had been anticipated, with the ending of the Five Year Forest Renewal Agreement, that a new Forest Renewal Agreement would have been negotiated and in place with the beginning of the new fiscal year, April 1st, 1989. The new agreement did not occur and at year end, March 31st, 1990, negotiations concerning funding levels were not yet initiated. In the interim the provincial government has provided funding for Manitoba's forestry programs at a level consistent with the last and fifth year of funding of the forest renewal agreement. This allowed reforestation, Geographic Information Systems, tree improvement, stand tending and communications programs to continue operating at 1989 levels.

The organizational structure of the Forestry Branch remained the same as it had during the previous year. A few minor changes were made in most of the sections to accommodate rotational training assignments and to meet changing and evolving needs within several of the programs. The organization chart for the branch for the year can be found appendixed to the back of the report.

In the area of forest policy three major activities were carried out to support the continuing improvement to The Forest Act and Regulations and sound forest management in Manitoba. The first policy initiative saw the establishment of Bill 9, an amendment to The Forest Act which allows for the assessment of a forest renewal charge to be paid by all persons harvesting Manitoba timber. By year end the bill had received second reading and early in the new year will undergo Standing Committee review, third reading and proclamation. The second policy initiative saw the completion of the Timber Quota System review which was carried out by two consultants, Mr. Don Elliott and Mr. Harry Laws. The consultant's report was reviewed with the industry and final recommendations made regarding the implementation of the consultant's findings. It is expected the recommendations will be assessed early in the new year and the expected changes put into the 1990-1995 quota period.

The third and perhaps most significant policy initiative was the Sustainable Development, Land and Water Strategy Workbook on Forests. The workbook was designed during the year, released to the public and a series of consultative workshops were carried out during the latter part of the year. The workbook on forests contains eight draft policies and a series of related subpolicies which were reviewed with the public at the consultative meetings. The outcome of the meetings and the mail-in portion of the workbook will be used to formulate policies which will then be reviewed through the legislative process. These policies and sub-policies will ultimately form the basis for forestry programming and activities to be carried out by the Forestry Branch over the next few years.

One of the highlights of the year was the two-day branch meeting held at the Gull Harbour Resort on Hecla Island. The meeting focused on issues likely to face the branch during the upcoming decade and the ways and means by which those challenges could be met. The meeting was well attended and all of the staff actively participated in all aspects of the program. Proceedings of the meeting will be prepared during the early part of the next fiscal year and strategies will be developed during the next year on how the branch can meet the challenges of the 1990's.

A grant assistance during the fiscal year was provided to both the Manitoba Forestry Association and the Forest Engineering Institute of Technology. Both agencies provided considerable support and technology transfer respectively to the Forestry Branch's programs particularly in communication and education of school children and information about forest product manufacture to Manitoba's forest industry. In the area of public communication the branch was involved at a national level with the Canadian Forest Communicators Committee in respect of the publication "Canada's Forest Heritage" and the game of knowledge about forests and trees entitled "Treevia". Branch staff in carrying out their respective duties and responsibilities participated on a number of provincial and federal/provincial committees, workshops and seminars.

FOREST MANAGEMENT

Introduction

The severe wildfire occurrences during the year affected many of the normal ongoing activities of the Forest Management Section. Delays which resulted and activity re-orientation which had to be incorporated into each program will continue to have an impact on the section well into the coming year.

Forest Management Licence Agreement Number 2 was signed by Repap Manitoba Inc. and Manitoba Natural Resources on May 4, 1989 as part of the Share Purchase Agreement signed on March 10, 1989 between Repap Pulp and Paper Inc. and the Province of Manitoba. This action provided for new utilization and market opportunities for small dimension mature softwood and hardwood trees where few opportunities previously existed.

Action towards development of a private land forestry (Farm Woodlot) program continued with additional contact between Manitobans in the south western and western portions of the province. Information obtained continued to indicate that forest land owners are interested in learning about resource management activities of a broad nature which could be incorporated into farm life and additional economic opportunities which resource management activities would generate.

Maintenance of Forest Inventory activities were focused on north central and north western portions of the province (Highrock and Nelson River forest sections) but wildfires occurring in the project areas resulted in deferring forest survey activities to next year in many cases.

The final forest inventory report to provide new Annual Allowable Harvest levels for the area was prepared for Forest Management Unit 30 in the Lake Winnipeg East forest section.

Permanent sample plots designed to track forest growth changes over time continued to be established in representative forest stands across the province. Permanent plots established five years ago were remeasured for the first time providing the first set of measurements to establish actual growth trends and to predict volume accumulations into the future.

The "FORIST" system (Forestry Geographic Information System) operated throughout the year on a single shift basis and a second shift operated for half the year. Entry of forest cover data into computer storage was completed for portions of the Lake Winnipeg East, Mountain, Interlake, Saskatchewan River, Highrock and Nelson River forest sections of the province covering an area of 54,800 square kilometers.

Aerial Photography

With the signing of Forest Management Licence Agreement Number 2 with Repap Manitoba Inc. the planned priority project area for aerial photography changed from Forest Management Unit 94 and 99 in the Highrock Forest Section to Forest Management Unit 89 in the Nelson River forest section. The area planned was reduced from 14,200 km^2 to 5,700 km^2. Due to smoke from wildfire activity followed by cloud only 60 percent of the new project area was completed in the available time period, the remaining portion of the contract area being deferred until next year. Additional photography of approximately 5,900 km^2 to determine fire losses for three major fires which occurred in the spring including the Sand River fire (Manigotogan area), the Interlake fire and the Cowan fire was completed under contract with Regional Services.

Forest Cover Mapping and Photointerpretation

Forest cover mapping was completed in the planned portion of the Highrock forest section in north western Manitoba on an area of 19,400 km^2. Additionally, fire boundaries were transferred to completed forest cover maps representing an additional 10,000 km^2 and is continuing. Photointerpretation was impacted by assignment of photointerpretors to wildfire actions which continued after the fire season ended. Of the planned 19,400 km^2 area only 17,900 km^2 were completed during the year in Forest Management Units 64, 65 and a portion of 66. The area completed, although not as large as planned, exceeded the previous year by 20 percent.

Forest Resource Surveys

a) Resource Inventory

Forest Survey activity planned for the Highrock forest section was deferred until next year as all forest management units scheduled were effected by forest closure due to wildfire. Field personnel were diverted to Growth and Yield activities.

b) Growth and Yield

Growth and Yield activity accelerated in the southern part of the province where wildfire activity did not adversely effect forest survey activity. Forty seven (47) permanent sample plots containing 10,803 trees were established in the Mountain, Pineland, Lake Winnipeg East, Interlake and Saskatchewan River forest section and seventy (70) permanent plots, containing 791 trees, established five years previously, were remeasured for the first time in the Mountain, Interlake and Lake Winnipeg East forest section.

Forestry Geographic Information System (FORIST)

The loading of new and recent available forest cover information into computer storage continued with good results. A second shift of digitizing workstation operators worked

for approximately half of the year. Over 1,600 forest cover map sheets each covering an area of 9,500 hectares or 95 km^2 have now been entered into the "library" storage area of the Geographic Information System of which 561 were completed during the year. Data compilation was completed for all planned Forest Management Units covering an area of 24,600 km^2 plus an additional 30,200 km^2 which was achieved over and above expected objectives. Unfortunately, this new information for the Nelson River and Highrock forest sections and additional Forest Management Units was affected by losses due to the severe wildfire occurrences, therefore final processing was postponed to allow for updating of losses incurred. The fire updating activity will continue well into the new year before final processing of the Forest Management Units is possible.

Two additional "stand alone" Geographic Information System workstations were purchased and installed at the regional forestry offices in Swan River and The Pas, Manitoba. All four regional offices are now equipped with this new technology. The purpose of the "stand alone" system is to allow direct information entry and subsequent impact analysis as required for forestry regional offices and sub-offices across the province, and the Forestry Branch's section offices in Winnipeg. Computer program development to meet forestry regional office requirements continues with the entry of timber sale locations, depletion and area change information entry into the data base.

TABLE 1: FOREST INVENTORY PROJECTS, 1989 - 1990

Activity	Planned Area km^2	Actual Area km^2
Aerial Photography	5,700	3,230
Phototyping	19,400	12,870
Forest Cover Mapping	19,400	19,400
Air Photo Interpretation	19,400	17,900
Area Compilation (Forist Library)	24,600	54,800
Forest Inventory Reports	24,600	11,160

Wildfire Management

The wildfire damage and loss reports for the 1988-1989 fire year were carried forward into the 1989 - 1990 fiscal year. The calculation of this data was completed for the 982 wildfires which occurred, burning over 485,653 hectares resulting in a merchantable forest volume loss of 16,298,000 cubic metres. During the calculation of these fire losses the worst fire year in recorded history occurred. To date 1,147 wildfires have been reported for the 1989 - 1990 year covering a preliminary estimate of 3,000,000 hectares. Calculation of the actual significant losses in this fire year will continue late into next year.

SILVICULTURE

Introduction

Silviculture refers to the art and science of growing trees. It involves not only the renewal of harvested or burned forests but also the subsequent tending of the crops.

The goal of the silviculture program is to improve the productivity of the regenerated forest. This will increase the Annual Allowable Cut and ensure long term economic and environmental benefits to Manitobans.

The role of the Manitoba Forestry Branch Silviculture Section is to co-ordinate the implementation of Manitoba's silviculture program and ensure that provincial silvicultural standards are achieved in the most cost efficient manner. The Section has three major subdivisions: Clearwater Forest Nursery at The Pas, Pineland Forest Nursery at Hadashville and the Silviculture and Tree Improvement Section.

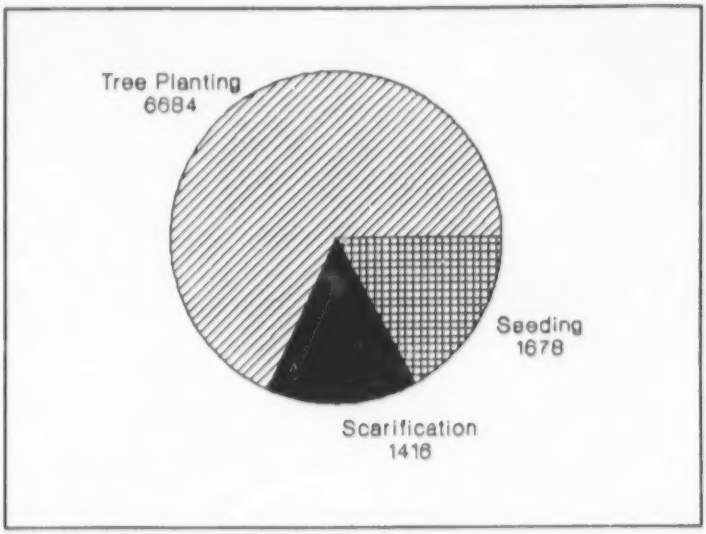
Silvicultural field programs such as site preparation, direct seeding, planting and stand tending are implemented on forest lands in Manitoba by the Forestry Branch Operations Section and Industry (Repap Manitoba Ltd. and Abitibi-Price Inc.). Industry is responsible for forest renewal activities on burned areas and areas that they have harvested within their Forest Management Licences (FML). The companies pay for these activities through their Forest Renewal Trust Fund. This fund has been established from the forest renewal charge which is levied on the companies as a separate fee, in addition to the regular stumpage charge, for all wood harvested within their FMLs.

Field Programs

The Forestry Branch and forest industry carried out regeneration treatments on 9,678 hectares of forest land as part of the provincial reforestation effort. The majority of the area was planted; seeding and scarification to promote natural regeneration was performed on the balance (Figure 1).

Reforestation treatments are typically carried out on areas which were harvested the previous year. Based on the volume of wood cut in 1988/89 an estimated 12,000 hectares was harvested. Therefore, 81% (9,678 ha) of this area was treated for reforestation in 1989 and the remaining 19% was left to regenerate naturally or be treated in subsequent years. However, a portion of the 9,678 hectares treated also included area burnt in 1989, area harvested prior to 1988 and area retreated. Categorizing the various forest renewal activities based on when the area was harvested or burnt would give a more accurate picture of the area being treated, area left to regenerate naturally and area requiring treatment. The development of the Regional Forest Management Information System will enable field staff to track the history of harvested or burnt areas and their subsequent treatments. This in turn will produce provincial summaries with all treatments categorized under burned area, recent cutover, backlog, or retreatment.

FIGURE 1: 1989 - 1990 REFORESTATION TREATMENTS (hectares)



The forest renewal program increased in 1989 - 1990 (Table 2) primarily due to aerial seeding jack pine on approximately 1500 hectares of recently burnt cutovers. The vast majority of the area burnt in last year's devastating fires will be left to regenerate naturally. However, recent cutovers and young stands which had not developed the cones needed to reseed the site are being priorized by field staff for planting or aerial seeding.

Although the total number of hectares treated in 1989 - 1990 increased, the number of trees planted (13.5 million) was over 2 million seedlings less than the 1988 - 1989 planting program. The disastrous fire season that occurred in Manitoba during 1989 delayed planting the spring planting season as well as the seedling lift and packaging at the nursery. As a result approximately 1 million seedlings degenerated in storage and had to be culled.

On March 31, 1989 the five year Canada/Manitoba Forest Renewal Agreement expired, and was not renewed as anticipated. Under the Agreement the Federal Government provided funds for Repap Manitoba Inc. and Abitibi-Price Inc. to plant up to 1.8 million seedlings annually. The program targeted harvested lands in the FML which were not reforested by the Province of Manitoba prior to licence issuance to Repap and Abitibi-Price. In 1989, planting was limited by the funds available in the sixth "wrap-up year" of the agreement. As a result, only 124,000 seedlings were planted on licenced lands.

Approximately 75% of the 7.5 million seedlings planted by the Forestry Branch were planted by tendered tree-planting contractors. Problems occurred with a few of the contracts when they had to be extended or cancelled due to the fire shutdown. The contract has

since been revised to ensure there is no misunderstanding of the compensation levels and to provide penalties to contractors with inadequate production levels. These changes are crucial to ensure that the seedlings are planted in a short time period as prolonged storage will reduce the seedlings' vigour and survival.

Scarification to promote natural regeneration of jack pine occurred on 1416 hectares. This treatment involves a skidder pulling a set of spiked anchor chains through a cutover to break up and distribute the cone-bearing branches, and to lightly mix the soil and humus layers which provides a seedbed for germination. Jack pine cones will open and disperse their seed after they have been heated by the higher temperatures close to the soil. This treatment has proven to be a cost effective and very successful method of regenerating jack pine on specific sites.

TABLE 2: 1989 - 1990 FOREST RENEWAL ACTIVITIES

1989 - 1990 Forest Renewal Activities	Manitoba Forestry Branch Operations Section	Abitibi-Price Inc.	Repap Manitoba Ltd.	Total
Site Preparation (ha)	2,473.0	1,310.0	2,256.0	6,039.0
Renewal				
Trees Planted (000's)				
Container Stock	2,288.44	1,427.97	4,040.5	7,756.91
Bareroot Stock	5,272.5	512.14		5,784.64
Total # Trees (000's)	7,560.94	1,940.11	4,040.5	13,541.55
Hectares Planted	3,625.5	988.6	2,070.0	6,684.1
Hectares Seeded	243.5	1,240.0	94.9	1,578.4
Hectares Scarified For Natural Regen.	825.8	Nil	590.0	1,415.8
Total Hectares Treated	4,694.8	2,228.6	2,754.9	9,678.3
Stand Tending				
Hectares Thinned	103.5	82.0	Nil	185.5
Hectares Herbicided	114.7	Nil	Nil	114.7
Hectares Treated for Weevil or Mistletoe Control	Nil	Nil	Nil	Nil
Cone Collections (hectolitres)				
Jack Pine	62.0	21.0		83.0
Red Pine	6.6			6.6
Scots Pine	1.5			1.5
Black Spruce	71.0	5.0	60.0	136.0
White Spruce	19.8			19.8
White Cedar	1.2			1.2
Total Collected (hl.)	162.1	26.0	60.0	248.1

Numerous methods were used by the Forestry Branch and industry to prepare cutover sites for the 1989 - 1990 tree planting program. The methods used, in descending order, included: Bracke patch scarifier; various disc and power trenchers; Ripper tooth; dozer and shearblade; chains and barrels; herbicide ground application; and burning of windrows. The Alberta Forest Service loaned two of its Bracke scarifiers to the Forestry Branch to assist with the completion of the site preparation contracts in the Western Region.

The Forestry Branch used herbicide applications to release plantations from competing vegetation on a relatively small scale with only 115 hectares treated by aerial applications. All applications used the herbicide VISION. Manual thinning and release was also carried out on older plantations and young natural stands.

The amount of cones collected was much lower in 1989 - 1990 than in previous years. This was due to the supply of white spruce seed already in storage and the unresolved negotiations with Repap Manitoba regarding responsiblity for cone collection under the new Repap Agreement. The amount of cones collected in 1990-91 is expected to double due to the urgent need for black spruce seed for northern planting stock and for jack pine seed for aerial seeding of burned sites.

Snow caches of seedlings for spring planting were established for the first time in Manitoba by the Forestry Branch at Berens River and Lake St. George, and by Repap near Overflowing River. The snow caches are constructed at the planting site in the winter by covering boxes of frozen seedlings with snow and sawdust for insulation. The sawdust prevents the rapid melting of the snow and keeps the seedlings in a healthy, frozen state until outplanted in late May. These caches are particularly useful in areas where it is difficult to deliver seedlings during the planting season.

Pineland Provincial Forest Nursery Programs

The Pineland Provincial Forest Nursery shipped 5.8 million bareroot seedlings and 3.3 million container seedlings for forest renewal programs. Root growth potential studies were conducted at the nursery on the various stock types to determine the impact of storage period on the seedlings' ability to produce new root systems. These studies identified that the bareroot seedlings were losing vigour following storage for prolonged periods.

In 1989 prolonged storage periods due to the severe fire season delayed a number of planting contracts, which resulted in 731,350 seedlings having to be culled at the Nursery and 200,000 seedlings culled in the field. Although little can be done about fire shutdowns, this year's experience did illustrate the need to shorten the planting period to ensure that seedlings maintain high root growth capacities. As a result in 1990 seedlings will be planted in a shorter time period. Stiffer penalties will be applied to contracts which exceed the planting deadlines. The amount of stock overwintered in the freezer units will be increased, and snow caches will be used to store 570,000 seedlings in the field.

In addition to the trees which were shipped from the nursery, 3.9 million spruce seedlings were transplanted and 5.5 million bareroot and container spruce seedlings were placed in Pineland's freezer unit for overwintering. The use of the freezer for overwintering frozen stock avoids any potential problems with winter desiccation (drying) and provides optimum storability for seedlings destined for areas with later planting seasons.

Pineland Nursery also produced stock for the woodlot and Christmas tree growers, special interest groups, Parks Branch, Boy Scout planting and for the Provincial tree improvement program. The following was acheived under the tree improvement program: seedlings were grown for a black spruce seed orchard and a white spruce family test; 7,000 grafts of white spruce were completed for a clonal seed orchard; and a black spruce clone bank was planted on the Nursery site.

A three-year nursery soil calibration contract with the University of Toronto was completed this year. The contract identified the need to modify the pH levels and watering schedules on a number of nursery beds which had chronic problems with poor seed germination and subsequent growth. Corrective measures are currently underway at the nursery.

A contract to grow one million black spruce container seedlings was awarded to Sioux-McDonald Ltd. Under the terms of the contract, staff at Pineland Nursery will provide direction to the contractor and monitor the growth progression of the crop.

Clearwater Provincial Forest Nursery

The Clearwater Provincial Forest Nursery shipped 4.7 million container seedlings for planting by Repap Manitoba Ltd. and the Forestry Branch's Northern Region. Twenty light greenhouses were utilized to produce this year's crop. The planned shipment in 1990 will increase to 5.2 million seedlings.

A small greenhouse was added onto the growth monitoring lab at Clearwater Nursery, to study the root growth potential of the various stock types. The growth of the seedlings is also monitored by the Nursery in outplanting trials. Another experiment carried out this year involved a six-month trial of two infrared propane heaters for the greenhouses. This heating system may result in lower energy usage and provide more uniformed heat within the greenhouses.

This year one million frozen container seedlings were shipped from Clearwater Nursery to Pineland Nursery for overwintering in it's freezer storage unit. These seedlings will be shipped back to The Pas in the spring of 1990 for planting by Repap Manitoba Ltd. Although these shipments cost approximately $5,000., overwintering in the freezer unit results in a reduced risk of overwintering desiccation and spring frost damage as well as an extended planting season. Next year 1.6 million seedlings will be shipped to Pineland Nursery for frozen storage. The construction of a freezer storage unit at Clearwater Nursery has been proposed but funding constraints have delayed its development.

Tree Improvement Program

The goal of the tree improvement program is to increase the yield and quality of wood produced from plantations through the development of genetically improved planting stock. The approach being taken involves selecting a large number of "plus" trees, which appear to be superior due to their above-average growth and excellent stem form. The seed from each tree is considered a family and is used to establish family tests and seed orchards. The family tests are used to determine which trees are superior, and therefore should be left in the seed orchard to produce genetically improved seed.

A jack pine tree improvement program was initiated in Manitoba by Forestry Canada over twenty years ago. During the past five years the Manitoba Forestry Branch has worked with Forestry Canada to establish seed orchards throughout the Province. In 1989 the management of these orchards became the responsibility of the Forestry Branch. These orchards are expected to begin producing seed in the next three to four years.

The forest industry has recognized the program's potential to increase the productivity of future forests and as a result both Abitibi-Price Inc. and Repap Manitoba Ltd. have established co-operative tree improvement programs with the Forestry Branch. The achievements of these and other tree improvement programs in Manitoba are shown in Table 2.

In 1989 - 1990 the following activities occurred:

- 171 black spruce plus trees were selected in the Interlake by the Forestry Branch. Two mass-selection seed orchards will be established in 1991.

- Three 3.2-hectare black spruce family test sites were planted by Abitibi-Price and the Forestry Branch as part of their co-operative tree improvement program in Lake Winnipeg East. Grafts of the original plus trees were planted in the Provincial clone bank at Pineland Nursery and a 9-hectare seed orchard site was prepared for planting in 1990.

- Three black spruce family test sites were prepared by Repap Manitoba and an 11-hectare seed orchard site was cleared by the Forestry Branch, all as a part of their co-operative program in the Saskatchewan River zone near The Pas. The family tests will be planted next year and the orchard in 1991.

- Four 2.0-hectare white spruce family test sites were planted in the Duck and Porcupine Mountains by the Forestry Branch. Branch tips (cuttings) from the 380 plus trees were collected this winter and grafted at Pineland Nursery for a clonal orchard.

In summary, with the exception of not fencing one test site the tree improvement program achieved the targets identified in the 1989 - 1990 work plan. The only major problem encountered this year was with regard to the site preparation of the family test sites in the Saskatchewan River zone. Two of the sites were not prepared to standard due to one site having too thin a duff layer and the fire situation, which resulted in the site preparation supervisor being

committed to other duties. One highlight of the year was the development and use of a computer mapping program for the family tests using the Husky Hunter$_{tm}$ dataloggers.

Silviculture Surveys Program

Regeneration surveys are the initial inventory carried out on an area following harvesting, fire or reforestation treatment. The purpose of the regeneration survey is to document the presence of softwood and hardwood regeneration and provide a comprehensive assessment of seedling quantity, quality and spatial distribution. The information collected by regeneration surveys is an essential component of a sound forest management strategy.

TABLE 3: TREE IMPROVEMENT PROGRAM UPDATE TO 1989 - 1990

Species	Breeding Zone	# Plus Trees Selected	Family Tests Established	Seed Orchards Established	Clone Bank
Jack Pine	Eastern	226	4 sites 4.1 ha	6.0 ha	0.2 ha
	Western	244	1 site 1.0 ha	---	
	Interlake	320		4.0 ha	
	Northern	320		4.0 ha	
Black Spruce	Southeast	450	2 sites 10.1 ha	---	
	Lk. Wpg. East	450	3 sites 9.6 ha	(9 ha. prepared)	0.7 ha
	Interlake	171			
	Sask. River	450	(3 sites prepared)	(11 ha. cleared)	
White Spruce	Mountain	380	4 sites 8.1 ha	(5 ha. cleared)	
	TOTAL	3,011	14 Sites 32.9 ha	14.0 ha	0.9 ha

Most areas are surveyed between three and seven years following depletion to enable the detection of seedlings which meet established age and height standards. Surveys are conducted in Manitoba by the Forestry Branch Silviculture Section and by representatives of Abitibi-Price Inc. and Repap Manitoba Inc. on their respective licence areas. Silviculture section staff also conduct "check surveys" on those surveys performed by forest industry in order to ensure provincial survey methods are being applied properly.

In 1989 a total of 13,320 hectares were surveyed by Forestry Branch and industrial surveyors. The forest industry conducted 8,544 hectares of regeneration surveys while the Silviculture Section surveyors accounted for the balance of 4,776 hectares. Each company analyzes the results of their own surveys, while the Silviculture Section analyzes the Branch results and reviews the forest industry findings.

The analysis of regeneration survey results has been refined in recent years to include the amount of area regenerated to softwood, mixedwood and hardwood covertypes.

Areas identified as not satisfactorily regenerated (NSR) are brought to the attention of forest managers and are given consideration for further renewal efforts.

The regeneration survey results of 1989 generally indicate that the area of harvested mixedwood and hardwood blocks is being balanced by mixedwood and hardwood regeneration. Prompt, satisfactory regeneration of softwood sites continues to be an area of concern that is being addressed by regional forest managers and the Silviculture Section.

Other Silviculture Section Programs

In 1989, Interim Stocking Standards were developed by the Silviculture Section in consultation with forest industry and regional forest managers. These standards address the increased utilization of hardwoods in Manitoba and the maintenance of the mixedwood forest ecosystem.

A pilot study of applying the hardwood, mixedwood and softwood interim stocking standards was carried out on the 1989 regeneration survey results. The study presented the results in terms of the success in maintaining the original forest covertypes and also how the forests are developing. Due to the small sample size in 1989, the results have not been presented here. However, a larger study including the past five years of regeneration surveys (over 50,000 hectares) will be conducted in 1990.

The co-operative field trial will be conducted to determine the effects of vegetative competition on developing plantations in a local Manitoba forest ecosystem. This will be implemented by the Forestry Branch Silviculture Section and Repap Manitoba Inc.

Regional Forestry Branch staff expressed interest in obtaining more information regarding the use of VISION herbicide as a silvicultural practice. In response the Silviculture Section co-ordinated a one-day "Vision Environmental Seminar" with representatives of Monsanto Canada Inc. The seminar was well attended by representatives of the forest industry and government from Manitoba and Northwest Ontario. Topics presented included chemical structure, toxicity, factors affecting performance, growth response, environmental monitoring, control of aspen in a white spruce plantation and a proposed co-operative field trial of Vision for plantation release.

The development of a Silviculture Manual for Manitoba was initiated in 1989 - 1990. The main purpose of the manual is to provide operational guidelines to field staff on various aspects of silvicultural practices in Manitoba. The first chapter on Administration, Policies and Contracts was circulated to field staff in March, 1990.

A Silviculture Section report on direct seeding was also prepared and circulated to field staff in 1989 - 1990. The report involved a review of research throughout North America, with recommendations made on crucial points to consider before prescribing direct seeding as a renewal treatment.

FOREST PROTECTION

Spruce Budworm

Spruce Budworm has historically been a moderate to severe defoliator of the white spruce/balsam fir component of Manitoba's forests. Populations have fluctuated greatly over the last century and the present outbreak which began in the early 1980's is still increasing in size and intensity. Suppression of budworm populations below economic thresholds (to prevent 50% or more defoliation) is carried out to protect timber resources and prevent mortality of trees in parks and cottage areas.

A spruce budworm suppression program was implemented over an area of approximately 5,000 hectares of high use recreational land (campgrounds and cottage subdivisions) and high value timber in the Abitibi-Price FML.

The pre-spray survey for spruce budworm occurred from May 21 to May 25, 1989 confirming the necessity to spray and the appropriate timing of application. Pre-spray population levels averaged 10 larvae per 45 cm of branch in Nopiming Provincial Park, 9 larvae per 45 cm of branch in the Whiteshell Provincial Park and 17 larvae per 45 cm of branch in the FML. These levels have the potential to cause moderate to severe defoliation.

The biological bacterial insecticide, *Bacillus thuringiensis* (Dipel 132) was aerially applied undiluted at 30 BIU per hectare at a rate of 2.4 litres per hectare. All application blocks were opened May 30, 1989. Weather conditions were generally favourable with temperatures ranging from 7 to 18° C, relative humidity in the 70 to 85% range and light winds up to 8 kph. Spray operations were completed by June 4, 1989.

The post-application survey and efficacy assessment was carried out June 12 to 14, 1989. Defoliation assessments were done in August, 1989. Larval reduction due to insecticide (using Abbott's formula) was 27% for the project as a whole. Foliage protection was adequate in terms of preventing tree mortality, but better results are necessary to avert continued stand decline.

Larval reduction and foliage protection in general were less than desirable for both host species despite the timing of application, (peak 3rd instar and a fir shoot class 4), being generally accepted as optimum for balsam fir. A single Bt application of 30 BIU per ha provided adequate control in terms of preventing tree mortality, but better results are necessary in some areas of the treatment program to avert continued stand decline.

Egg mass surveys were carried out in August 1989 to predict spruce budworm defoliation for 1990 in Whiteshell and Nopiming Provincial Parks and in the Abitibi-Price FML area. Light defoliation is predicted for the Whiteshell including Falcon, Westhawk and Dorothy Lake areas. Moderate to severe defoliation is predicted for Nopiming Provincial Park and the Abitibi-Price FML.

Jack Pine Budworm

Jack pine budworm is a major defoliator of jack pine in Manitoba. This pest consumes mostly new growth and after two to three years of severe defoliation can cause top-kill, reduced vigour, growth loss and tree mortality. Large areas of pine can be infested as occurred in 1985 when two million hectares were defoliated in Manitoba.

Unlike spruce budworm, populations of jack pine budworm tend to rise and collapse suddenly. Epidemics generally recur every seven to eight years and last for two to four years. Monitoring jack pine budworm populations has traditionally been by egg mass survey. This method, although reasonably accurate during the rise and peak phases of an outbreak may be less accurate in predicting population collapses and endemic population fluctuations to epidemic levels. Pheromone traps are now used as a more indicative method of monitoring endemic populations. This survey method has been experimentally field tested at 12 locations throughout the range of jack pine in Manitoba since the collapse of the last epidemic in 1986.

From 1985 to 1988, three concentrations of the pheromone lure and two trap designs were compared. Based on 1988 results, the 0.03 microgram concentration of the pheromone lure and two trap types (saturating Pherocon 1C and non-saturating Multipher) were tested in 1989. Tree branches were collected at each location and assessed for defoliation, egg masses and staminate buds. Defoliation remained at a low level and there was no increase in egg mass numbers during 1989.

Male moth captures decreased from 1985 through 1987, and have now begun to increase in numbers. Table 4 shows male moth captures for the 0.03 microgram concentration per location for the Pherocon 1C traps.

Renewed Forest Pest Survey

A Renewed Forest Pest Survey to determine occurrence and distribution of major pests causing main stem deformity, growth loss and/or mortality in high-value renewed stands and highly productive sites was implemented in 1987. The focus has been placed on highly productive stands due to limited time and resources.

Beginning in 1987, 76 renewed forest stands covering 2,686 ha have been surveyed in the Province of Manitoba. In 1989, 7,616 trees were sampled in stands ranging between 6 and 50 years of age (11,662 trees from 1987 to 1989). In 1989, 43 renewed stands totalling 1,694 ha were surveyed in the southeastern and western regions of the province. Five red pine stands (86.8 ha) and 17 jack pine stands (432 ha) were surveyed in the southeastern region. Six white spruce stands (346.4 ha) and 15 jack pine stands (823.3) were surveyed in the western region.

In the southeastern region, red pine has shown significant branch/main stem cankering and tip dieback. Growth loss, multiple leadering and mortality are also evident in

TABLE 4: JACK PINE BUDWORM MOTH CAPTURES 1985 - 1989

Location	Total Number of Moths Captured				
	1985	1986	1987	1988	1989
Sandilands Prov. Forest	208	21	5	60	44
Spruce Woods Prov. Park	558	184	184	123	226
Whiteshell Prov. Park	50	48	18	28[a]	19
Belair Prov. Forest	38	43	15	47	13
Nopiming Prov. Fark	133	39	5	44	40
St. Martins	559	64	2	2	16
Porcupine Mtn. Prov. Forest	186	7	0	3	7
Moose Lake	63	2	0	3	2
Reed Lake	46	4	0	1	4
Kississing	76	4	0	5	15
Thompson/Wabowden	31	2	0	7[b]	5
Lynn Lake	112	1	0	0	0[c]
TOTALS	2060	419	229	323	391

a. 50 % of traps damaged

b. Plot relocated to Wabowden in 1988

c. Plot destroyed by fire, only 2 traps recovered.

some of the red pine stands. Problems evident on jack pine include western gall rust (*Endocronartium harknessi*), severe j-rooting and main stem cankering, as well as one incidence of chronic pine tortoise scale infestation (*Toumeyella numismaticium*).

The western region has several jack pine plantations with a high proportion of leaning trees. This severe j-rooted condition had resulted from machine planting. High incidence of western gall rust and root collar weevil (*Hylobius warrenii*) in naturally regenerated jack pine stands caused substantial mortality. Other problems included snow, hail, terminal weevil (*Pissodes terminalis*), sapsucker and rabbit damage. White spruce had severe rabbit damage whenever it was overtopped by regeneration, particularly aspen. White pine weevil (*Pissodes strobi*) damage was significant in some white spruce stands. Trembling aspen showed varying degrees of defoliation by several lepidopterous species and evidence of hypoxylon canker (*Hypoxylon mammatum*).

Western Gall Rust

Western gall rust is a disease of jack pine that can cause significant volume loss, especially when occurring in young plantations. Galls generally form on the main stem of seedlings causing reduced growth, deformities and weakening of the stem. Jack pine is presently 23% of Manitoba's forestry planting stock and is likely to increase to 28% by the year 2000.

Forestry Canada and Manitoba Natural Resources, Forestry Branch have established a pedigreed seed orchard from selected superior jack pine families in Manitoba. From this orchard, future seed orchards will be developed and provide all the jack pine seed requirements for provincial forest renewal programs. As part of the jack pine breeding program, a second study between Forestry Canada and Manitoba Natural Resources, Forestry Branch is to evaluate these superior families and their offspring for susceptibility to western gall rust.

In 1988, this ongoing study assessed the original family test replicates for presence and number of rust infections and also inoculated week-old seedlings of the first-cousin progenies. From the inoculation results, a disease resistant rating criteria was produced and a disease index was determined for each family. In 1989, seed from field-resistant and field-susceptible families plus seed from the original family parents were sown, grown and inoculated with western gall rust spores in the spring. Four to six months after inoculation, the seedlings were examined and assessed for rust infections.

Susceptibility to western gall rust has been included as a criteria for ranking the superior families and will assist in determining the Province's second generation program.

Armillaria Root Rot

As part of the jack pine dwarf mistletoe management program, red pine, a non-host species was planted on 1,300 ha of jack pine cutovers in the Belair Provincial Forest during

the 1970's. The young red pine stands have experienced some mortality due to drought and armillaria root rot (*Armillaria obscura*). In 1983, permanent sample plots were established in five root rot infection centres to monitor armillaria activity. The increase in tree mortality due to armillaria over the past five years in the sample plots has been 17%, 14%, 10%, 3% and 6% respectively. Total annual tree mortality to date within each plot has been 41%, 35%, 19%, 15% and 19% respectively. Armillaria activity appeared to be at a low level in the infection centres during 1989. Three plots showed no increase in mortality, while two plots had a 1% disease increase.

The presence of armillaria root rot has also been monitored since 1983 in thinned 40 to 50 year old red pine plantations in southeastern Manitoba. Both stumps and standing trees have been included in the assessment. To date, armillaria has only been detected in one stump and is absent from standing red pine. There is no current evidence to suggest that thinning enhances Armillaria infection in red pine plantations.

Pine Root Collar Weevil

Scots pine were planted in 1971 in the Grand Beach area of eastern Manitoba as part of a jack pine mistletoe management program. Initial Scots pine survival was excellent (greater than 80%) and growth was approximately 25 cm per year once trees became established. Beginning in 1981, significant chlorosis and mortality of trees occurred due to root girdling by the pine root collar weevil, *Hylobius radicis*. Permanent sample plots were established in 1983 in four affected plantations to monitor mortality levels due to weevil feeding. Mortality rates in the four plots increased by 37.0%, 9.8%, 25.8% and 27.5% between 1983 and 1989. Total mortality due to weevil feeding in the four plots was 43.3%, 14.9%, 30.9% and 41.8% for the period 1983 to 1989.

The high susceptibility of Scots pine to root collar weevil has made it unsuitable for commercial forestry planting within the range of this insect in Manitoba. Scots pine is a major Christmas tree species grown in Manitoba and should not be planted in the proximity of jack pine forests (the natural habitat of the root collar weevil).

Dutch Elm Disease Integrated Management Program

The objective of the Dutch Elm Disease (DED) program is to manage the loss of high value urban elm trees at less than two percent annually. The DED program uses an integrated approach to minimize the effects of DED on Manitoba's urban forests.

During the 1989 provincial summer surveillance season, approximately 15,000 elms were marked in and around urban and rural municipalities as hazards or as having DED. Many of these hazard trees were dead as a result of DED. Control efforts were once again concentrated on elms in and around the 45 cost-sharing agreement communities (CSA's). Wild elm trees in the central and eastern regions of Manitoba were not included in the provincial DED integrated management program due to the impracticability and expense of implementing control

procedures in wild stands. Within the CSA communities management efforts concentrated on sanitation, pruning, public education and liaison and basal insecticide spraying with chlorpyrifos for the control of overwintering elm bark beetles. The Forestry Branch is wholly responsible for the survey and removal of diseased, dead and decadent (hazard) elm trees within the CSA communities.

Severe drought conditions increased the stress on elm trees during 1989. This stress was reflected in a general increase in DED severity in all jurisdictions across the province. The northwestern front of the disease moved into the town of Dauphin and remained static around the village of Ste. Rose du Lac in the R.M. of Ste. Rose. Further west, on the Assiniboine River, the disease also remained stationary, about 750 metres northward from St. Lazare. Generally, despite increases in overall DED intensity, (especially in wild stands), the number of losses of urban elms in 1989 remained below two percent in most CSA communities.

The City of Winnipeg, which is responsible for its own survey and sanitation programs (under the terms of their CSA) marked 10,860 elm trees for removal.

The disease continues to spread along most of southern Manitoba's river systems. Mortality has reached as high as 90% in many wild stands east of the Red River. The spread of the disease west of the Red River, while slower, continues to threaten farm shelterbelts in the areas around Winkler, Altona, Morden and Carman. The Souris River southwest of Brandon is extensively infected in Manitoba and southward into the United States. Most communities in western Manitoba continue to cooperate fully within the CSA program to prevent significant increases in disease infection in their high value municipal elm populations.

During 1989 - 1990, the Forestry Branch Dutch Elm Disease Sanitation Program removed approximately 16,000 elm trees, many of these from buffer zones established in wild stands outside of the cities of Brandon and Winnipeg. The provincial program continued using as part of its removal crews the efforts of Corrections and Community Services' staff in a winter-works sanitation program which operated through much of 1989 - 1990.

The provincial elm removal and sanitation program was bolstered in 1989 to meet the challenge of increased disease intensity. In response to the increased removals, Forestry Branch added more departmental sanitation crews and Corrections and Community Service crews to ensure all diseased and hazard trees were removed prior to the 1990 infection season. The quick and timely response of the survey, CSA communities and sanitation components of the DED program allowed Forestry Branch to achieve its long term objective of keeping the provincial average annual loss rate of elms to less than two percent.

The primary vector of Dutch Elm Disease in Manitoba is the native elm beetle, *Hylurgopinus rufipes*. A major concern and possible threat to Manitoba is the migration and establishment of the smaller European elm bark beetle, *Scolytus multistriatus*. This beetle, also a vector of Dutch Elm Disease, has a more aggressive breeding habit and if present would considerably alter the integrated management program.

From 1979 to 1988, *S. multistriatus* has been captured at several locations in the City of Winnipeg. Numbers have generally remained at a low level. For the first time in eight years of monitoring, two specimens of *S. multistriatus* were captured at Forestry Branch monitoring sites. Continued monitoring of the eight permanent locations across southern Manitoba will indicate whether *S. multistriatus* can establish a population in the province.

Forest Nursery Extension and Research

During 1989 - 1990 the Forest Protection Section continued to provide diagnostic and extension services to the Pineland and Clearwater Provincial Nurseries.

Forty-four seedlot samples from Pineland Nursery were assayed by the Pacific Forestry Centre for 3 pathogens: *Fusarium, Pythium* and *Cylindrocarpon*. None of the samples showed *Pythium* or *Cylindrocarpon* pathogens and all of the seedlots except one had low levels of *Fusarium*. The test identified potential problem seedlots which allowed the nursery grower to take precautions.

Fusarium spp. caused root rot in black spruce container stock at both Provincial Nurseries. Mortality due to *Fusarium* was also identified in a 1 + 0 jack pine bareroot field at Pineland Nursery. Root rot due to *Pythium sp.* occurred in white spruce transplants at Pineland Nursery.

Public Information

During 1989 - 1990 numerous public inquiries concerning forest insect and disease problems were handled by Forest Protection staff. The section provided extension services to private companies, the public, other government branches and research organizations concerning identification and information on the management of forest and urban tree insects and disease.

Forest Pest Management

In addition to the spruce budworm program, Forest Protection is also charged with delivery of the Forestry Branch's herbicide application program within the context of the Silvicultural vegetation management mandate.

In 1989, 114.7 ha of renewed forest were sprayed with Glyphosate at an application rate of 4 L/ha in 35 L/ha of water. Product was applied using an Ag Cat with D1046 nozzles which provided a 22.5 m swath width.

The program lasted from September 6 to 10th, 1990. Operational costs of the program resulted in a per hectare cost of $158.40.

FOREST OPERATIONS

Introduction

In the 1989 - 1990 fiscal year the Forest Operations Section of the Forestry Branch met the objectives and responsibilities identified for the section.

In particular, the administration component of the section provided the required capital expenditure estimates, ongoing monitoring and supporting report documentation to ensure that the branch expenditures were within the target levels identified. To assist in this requirement, the administration component utilized the financial project management system which was developed within the Forestry Branch several years ago. This system which has been improved upon annually provides the branch the capability to estimate, monitor and report upon expenditures to ensure the necessary budget control that is required. Each of the branch's sections, regions and nurseries are fully operational on this system. Through the assistance of this system the Forestry Branch was able to track its expenditures to a point that the branch's 1989 - 1990 actual expenditures were within 0.5% of the budget estimates.

All sections of the branch utilize both tendered and non-tendered contracts and rental agreements in the delivery of their programs. A total of 69 contracts and 76 rental agreements were developed by the branch in the 1989 - 1990 fiscal year. These contracts were for activities ranging from tree planting, site preparation, aerial photography, computer and other technical service agreements, consulting and research. Operation Section staff have the responsibility to administer and process the support documentation and to ensure that the branch, department and provincial government guidelines are followed at all times in the delivery of these contracts. In all cases these guidelines and procedures were followed and met in the 1989 - 1990 fiscal year. The Forestry Branch was very successful in the delivery of its field operational programs through the use of contracts and rental agreements.

The Operations Section also provides administrative support on all personnel matters for the 79 permanent and 14 term employees and approximately 17 permanent departmental employees within the branch. In addition, casual departmentals were employed for time periods ranging from three to fifty weeks to assist with the delivery of field programs such as tree planting, forest protection, tree lifting, and elm tree removal. This was equvialent to approximately 184 additional staff years of assistance. As of March 31, 1990 there were four permanent and four term positions to be filled. This amounted to a vacancy rate of 7% for the branch. During the 1989 - 1990 fiscal year the branch filled through the Civil Service competition process 10 permanent and term positions.

To meet the overall Forestry Branch objectives and to assist in the delivery of and evaluation of its programs the Forestry Branch has been expanding in its use of computer technology. The Operations Section provides a support role for the purchasing of computer hardware and software, its installation, daily troubleshooting, and programming requirements. During the 1989 - 1990 fiscal year staff from the section were actively involved in the preparation of a five-year computer task report for the branch. This report outlined the needs

for the continued development of computer technology within the branch, the necessary hardware and software required to meet this need and the total expenditures required. This report has been approved by the branch's senior staff and the department's executive and will be followed on an annual basis subject to funding availability.

Also following under the responsibility of the Forest Operations section is the support required for the communication and public relations for the branch. Even though the position responsible for these programs was vacant for much of the year, there were several initiatives pursued by other members of the branch. This included the branch's ongoing support for the Forest Week activities and the Manitoba Forestry Association, printing and distribution of educational materials, branch representation of mall exhibits and major events (eg. Red River Exhibition) and development of two displays for use in regional malls.

The Forestry Branch continued to be represented on the Canadian Forestry Communications Committee, which pursued forestry initiatives at the national level. Despite lack of a Federal-Provincial Agreement joint communication activities between the Forestry Branch and Forestry Canada continued.

The timber administration component of the Operations Section has the responsibility of providing the administrative support for the management of our forests. This includes the development of the necessary documentation for the allocation of timber volumes to the forest industry, the recording and verification of volumes harvested throughout the province, the reporting on these volumes, and the collection and reporting of all revenues for the branch.

The harvest of timber from provincial Crown lands totaled 1,830,807 m^3 for the 1989 - 1990 fiscal year. This comprised of 1,676,979 m^3 of softwoods and 153,828 m^3 of hardwoods. This is 25,890 m^3 less than the previous year and represents a decrease of 1.39%. The production of lumber, fence posts, railway ties and fuelwood increased but pulpwood decreased compared to 1988/89.

Timber revenue decreased to $2,108,127.18 which represents a 19.60% decline from the previous year. This is attributed to the change in the Abitibi-Price Inc. Forest Renewal Agreement and the reduced stumpage rate charged on salvage wood in the Interlake Region and Belair and Porcupine Provincial Forests.

The timber stumpage rates were reviewed with the Manitoba Forest Products price index. A new rate was calculated for Aspen/Poplar and will come into effect May 1, 1990.

A total of 5,302 timber permits were issued this fiscal year which is an increase of 531 from the previous year.

Thirty-six permit quotas were in force in 1989 - 1990. Timber sale quotas amounted to 191, a decline of six from April 30, 1989.

The regional component of the Operations Section are responsible for the delivery of many of the branch's field programs. This includes the allocating of timber sale areas to the forest industry; assisting the Regional Services Branch in monitoring the forest industry for utilization and enforcement of The Forest Act and Regulations; the delivery of the forest renewal and stand improvement programs required to maintain and/or improve upon the forest resource within the region; to provide Forestry Branch input into land management decisions through representation on the Regional Planning Committee; to maintain liaison with the general public and the forest industry on forestry related matters; and to assist Regional Services in fire management planning and suppressional activities if required.

The regional staff were extremely active in all of these responsibilities in the 1989 - 1990 fiscal year. In timber management the establishment of new five-year timber sale areas for quota holders and special allocation holders was completed. Five-year forest operating plans were initiated for forest management units 20, 23, 30, 40, 41, 42, and 57. For areas falling within Repap Manitoba's Forest MLA, staff were preparing for the transfer of some forest management responsibilities to the company.

Forest renewal activities remained at approximately the same level as previous years and in all cases except for part of the planting program in the Southeast Region, tendered contracts were used to deliver these programs. Delivery of these programs through the tendered contract method went extremely well during this fiscal year and it is the branch's intent to maintain this delivery method as it allows branch staff time to monitor planting quality rather than spending time on personnel and direct supervisory responsibilities.

The major activity through the Regional Planning Committees evolved around the review and evaluation of the five-year operating plans for Abitibi-Price and Repap Manitoba. These reviews were extremely thorough, requiring considerable input by all parties involved and resulted in a departmental response to the two companies on their five-year plans.

With the extreme 1989 fire season the regional staff were actively involved in the fire suppression that was required to fight the many major fires throughout the province. The branch staff were utilized in a suppression or support role depending on the qualifications of the individuals and the needs on a particular fire. In many cases an important role was played by providing Regional Services staff with the information needed to determine timber resource priority areas and heavy concentrated fuel areas where the fires would have the potential to run.

Additionally, regional staff were involved in integrated forestry-wildlife management activities. This included a caribou habitat study in Abitibi-Price's FML area and development of a management plan for an important great grey owl nesting area in the Southeast Region.

Over the course of the year there were several other initiatives in which the Forest Operations Section staff were actively involved. The first involves the development of a Sustainable Development Workbook on Forests. This workbook being the third in a series of sub-strategies under the Sustainable Development Land and Water Sectoral Strategy was released

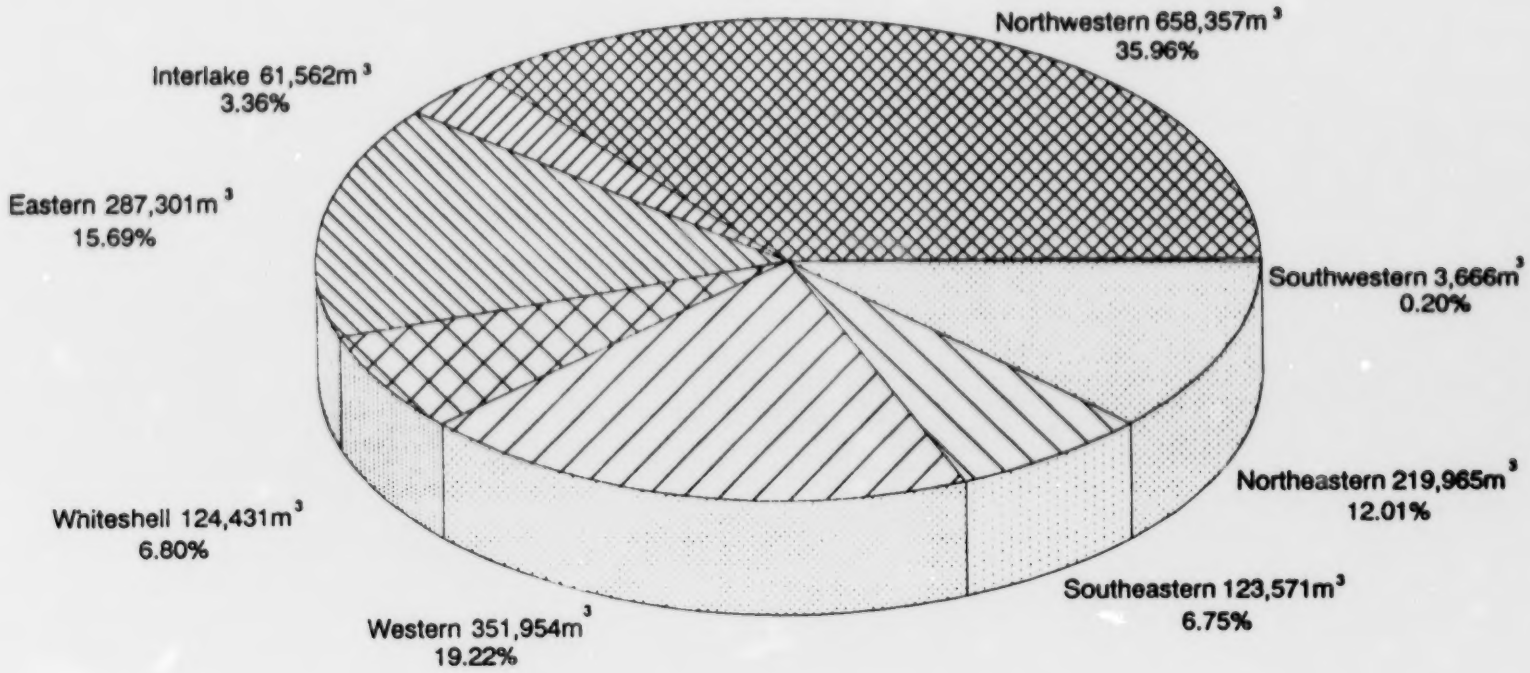
in January of 1990. This workbook contained draft objectives and policies which would provide for the sustainable development of Manitoba's forest resources. In cooperation with the Department of Environment the draft policies were presented to the general public through a series of public workshops held in fourteen communities around the province. The comments received on the workbook will be evaluated and the objectives and policies will be modified to reflect the direction given by the general public.

In September/October 1989, a series of meetings were held with those of the forest industry who presently hold cutting rights under the Manitoba Quota System. The intent of these meetings which were carried out by two independent consultants was to review some of the policies under the present Manitoba Quota System and to provide the industry's input into the report which would be produced by the consultants. Upon completion of this review the consultants submitted a report identifying their recommendations for a timber quota policy for the next ten-year operating period. This report is presently being reviewed by the Forestry Branch and the department's executive. Once approved these modifications to the timber quota policies will be incorporated into the Manitoba Quota System.

Legislation was also passed during the year to provide for a forest renewal charge on a per cubic metre basis on all wood harvested in the province. This legislation was passed on March 14, 1990 and will be enacted through additions to the forest regulations after the forest industry is consulted on the actual dollar value of the charge, the starting date and if the charge will be phased in over several years. In keeping with the sustainable development thrust, this forest renewal charge will place some of the actual costs for forest renewal upon the users of the forest.

The cost-shared Canada-Manitoba Forest Renewal Agreement expired on March 31, 1989. Negotiations for a new agreement were ongoing throughout the year, however, the year ended without an agreement in sight.

FIGURE 2: PERCENTAGE OF TIMBER PRODUCED WITHIN DEPARTMENTAL REGIONS



Total Timber Cut = 1,830,807m³

TABLE 5: RECORD OF TIMBER SCALED OR MANUFACTURED, 1989 - 1990

	Lumber						Pulpwood				Piece Products					Fuelwood								
	- Cubic Metres						- Cubic Metres				- Cubic Metres				Pieces	- Cubic Metres						- Cubic Metres		
																Green								
	Spruce	Balsam	Jack Pine	Other Soft Woods	Aspen	Other Hard Woods	Spruce	Balsam	Jack Pine	Poplar	Railway Ties	Cedar Poles	Jack Pine Poles	Posts	Christmas Trees	Spruce	Jack Pine	Poplar	Other Hard Woods	Dry	Slabs and Tops	Mine Timber	Round Timber	Totals
Summary by Regions																								Cubic Metres
Northeastern	56482		46136	296	196	60	60963		49896					2	100	740	1855	339	401	2691			6	216935
Northwestern	177984		140622				182884		149413					99	29	244	348	1123	1285	4041		178	188	660357
Whiteshell	166	151	11110	530	12542	72	29124	2616	21899	23480	330			1231	947		2179	12778	1307	2521	1226		1179	1244631
Southeastern	745		9847	32	11596	2159	30084	763	42085	5720	103			2620	2946	35	618	4383	6330	4683	687		1389	1225671
Southwestern	6				31									30	115			2290	552	712			43	5699
Eastern	3492		7239	535	11739	207	188478	676	57195	2529	571			235	6926	470	1652	3530	2500	5556			488	287991
Interlake	16279		2208		313		17151		10500	113				911	109	20	278	1999	485	7219			3099	61892
Western	136156		50726	22	9464	543	96114		15663	5306	103			19350	1681	151	268	7221	4436	4436	74		1827	551654
Total	393296	151	267690	1416	45685	3041	604798	4057	346651	37148	1107	0	0	24478	12865	1660	7369	33831	17295	31691	1999	178	7299	1699997
Summary by Status of Land																								
Provincial Forests																								
Spruce Woods														24				100					29	153
Duck Mountain	70847		17526		8065	144	34894		2459	5306	103			2990	1011	23	118	3297	2741	1181	13		1099	169998
Porcupine	50560		31725		1164	388	61843		12761					15894		101	18	696	826	2576			377	166689
Sandilands	633	150	8602	148	8125		26553	1218	39170	8461	24			2210	1584	15	1417	5193	4027	4693	1670		1391	115899
Cormorant														15		9	91	202	218	744				1279
Agassiz	116		946	346	6965	222	3951		1073	16532	60			283	10		966	9293	718	595	42		473	42857
Belair			2385				16214		12999	675	671			10			95	189	595	422				94388
N.W. Angle	112		1226	69	1392	2159	14367	2163	4722	2696	79			607	470	20	69	433	1804	23			299	32599
Turtle Mountain																		60	220	145				445
Whiteshell	62	1	9747		4825		9067		14510	191	270				242		63	710	163	1164	69		39	49949
Cat Hills			146		300		42		665										150	5	12			1320
Brightstone																		342	40	15				397
Moose Creek							2134												5	75				2214
Wampum			25														12	55	38	25	25			180
Swan-Pelican																		10						10
Total Provincial Forests	122320	151	72332	562	30856	2913	159065	3379	88389	34260	1107	0	0	22033	3327	168	2657	20600	11567	11567	1856	0	3699	696699
Other Provincial Land	270976		196358	853	15029	128	445713	678	258262	2868				2445	9528	1492	4532	13031	5728	20084	141	178	3742	1301218
Total	393296	151	267690	1416	45685	3041	604798	4057	346651	37148	1107	0	0	24478	12865	1660	7369	33831	17295	31691	1999	178	7299	1699997
Summary by Method of Disposal																								
Permit	7617	1	6578	623	5327	221	12748	3083	11315	20718	103			7055	5254	1382	6236	31631	11599	30940	1936		5725	164999
Sales	157466	150	72374	257	28855	2763	236541	974	96857	16430	1004			17423	7597	278	1119	2000	6697	848		178	1378	648999
Berths	228209		188738	536	11339	57	355509		238479								32			173			116	1023160
Seizures	4				364										4						61		69	486
1989-90 Total	393296	151	267690	1416	45685	3041	604798	4057	346651	37148	1107	0	0	24478	12865	1660	7369	33831	17295	31691	1999	178	7299	1699997
			711478						992654										83832					
1988-89 Total	367472	0	219446	1123	69960	6523	744734	17231	318291	8704	263	0	5	9511	15487	2706	7640	29484	18861	26160	699	135	7676	1699997
			664544						1088960										85811					

TABLE 6: SUMMARY OF TIMBER CUT ON CROWN LAND, 1989 - 1990

Product	Species	Cubic Metres		Percentage
Lumber	Spruce, Pine, Fir, Tamarack, Cedar	662,552		
	Poplar, Birch and other hardwoods	48,926	711,478	38.86
Pulpwood	Spruce, Pine, Fir,	955,506		
	Poplar	37,148	992,654	54.22
Railway Ties	Pine		1,107	0.06
Line Poles	Cedar, Pine, Tamarack, Spruce		0	0.00
Fence Posts	Cedar, Pine, Tamarack, Poplar, Spruce, Oak		24,478	1.34
Round Timber	Spruce, Pine, Tamarack		7,280	0.40
Mining Timber	Pine, Spruce		178	0.01
Fuelwood	Birch, Poplar, Pine Spruce and other		93,632	5.11
TOTAL 1989-1990			**1,830,807**	**100.00**
TOTAL 1988-1989			**1,856,697**	

TABLE 7: REVENUE FROM THE SALE OF CROWN TIMBER

Year	Total Harvest (in cubic metres)	Revenue[1]
1980-1981	2,320,031	1,908,776.72
1981-1982	1,782,078	1,792,589.82
1982-1983	1,478,092	1,383,734.70
1983-1984	1,500,332	1,964,510.80
1984-1985	1,673,031	2,302,339.73
1985-1986	1,688,897	2,473,081.25
1986-1987	1,669,132	2,682,289.37
1987-1988	1,854,337	2,961,462.33
1988-1989	1,856,697	2,622,014.79
1989-1990	1,830,807	2,108,127.18

[1] Dues in respect of Crown timber harvested.

TABLE 8: ANNUAL FOREST PRODUCTION BY FOREST PRODUCT (IN CUBIC METRES), 1980 -1981 TO 1989 -1990

	Pulpwood		Lumber		Fuelwood		Other		Total	
Year	Volume(m^3)	%	Volume(m^3)	%	Volume(m^3)	%	Volume(m^3)	%	Volume(m^3)	%
1980-1981	1,458,039	62.9	681,876	29.4	95,893	4.1	84,223	3.6	2,319,991	100
1981-1982	1,100,921	61.8	535,034	30.0	88,369	5.0	57,754	3.2	1,782,078	100
1982-1983	787,879	53.3	518,062	35.1	111,555	7.5	60,596	4.1	1,478,092	100
1983-1984	837,756	55.8	509,476	34.0	102,474	6.8	50,626	3.4	1,500,332	100
1984-1985	1,201,970	71.9	330,228	19.7	103,593	6.2	37,240	2.2	1,673,031	100
1985-1986	1,065,361	63.1	474,826	28.1	110,561	6.5	38,149	2.3	1,688,897	100
1986-1987	927,085	55.5	598,168	35.8	98,039	5.9	45,840	2.8	1,669,132	100
1987-1988	1,007,882	54.4	733,269	39.5	84,573	4.6	28,613	1.5	1,854,337	100
1988-1989	1,088,960	58.7	664,544	35.8	85,611	4.6	17,582	0.9	1,856,697	100
1989-1990	992,654	54.2	711,478	38.9	93,632	5.1	33,043	1.8	1,830,807	100

TABLE 9: PERMITS, LICENCES AND QUOTAS ON CROWN LANDS (INCLUDING PROVINCIAL FORESTS), 1988 -1989 AND 1989 -1990

	1988-1989	1989-1990
Timber Dealers and Sawmill Licences		
Timber Dealers	62	27
Sawmill Licences	117	86
Permits and Licences Covering Timber Cutting Rights		
Permits	4,771	5,302
Timber Sale Agreements		
Awarded	31	14
Previously Awarded	194	198
Timber Seizures Recorded	8	7
Timber Allocations in Force on March 31st		
Timber Sales	197	191
Timber Permits	36	36
Forestry Revenue (Crown Charges)	**$3,494,700.19**	**$2,913,937.71**

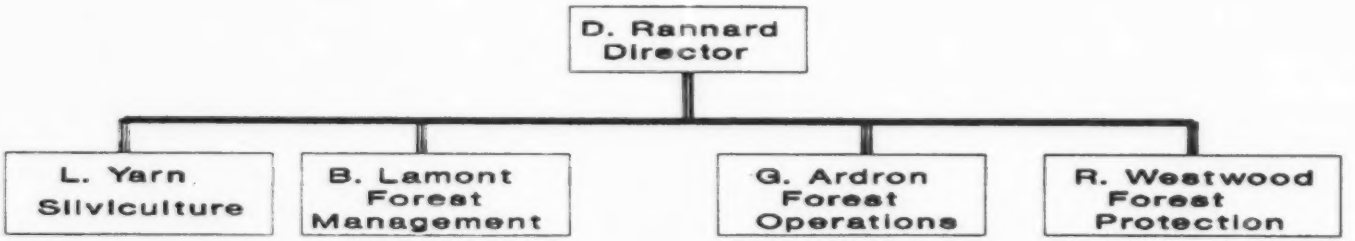
TABLE 10: TIMBER CUT BY DEPARTMENTAL REGION, 1989 - 1990

Region	Cubic Metres	Percentage
Eastern	287,301	15.69
Interlake	61,562	3.36
Northeastern	219,965	12.02
Northwestern	658,357	35.96
Southeastern	123,571	6.75
Southwestern	3,666	0.20
Western	351,954	19.22
Whiteshell	124,431	6.80
TOTAL	**1,830,807**	**100.0**

TABLE 11: PERMITS AND LEASES IN PROVINCIAL FORESTS 1988 -1989 AND 1989 - 1990

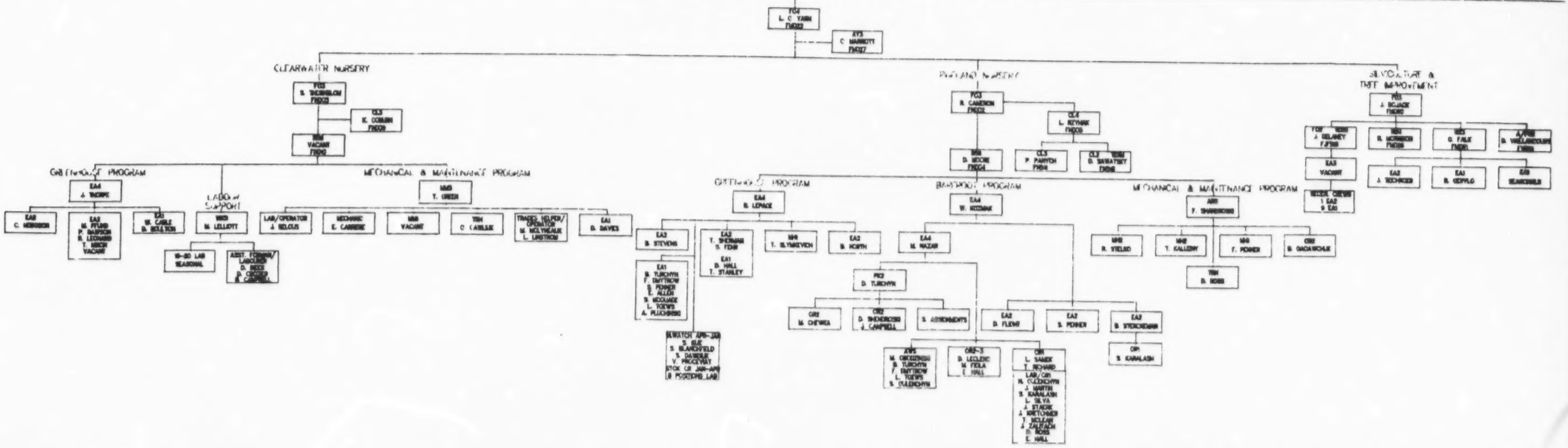
	1988-1989	1989-1990
General Permits and Leases		
Sawmill Site	1	1
Trappers' Cabins	35	34
Hunting and Fishing Cabins	2	6
Other Lodges, Cabins, Residences	7	5
Grazing Fences	-	-
Maintain Roads and/or Spurlines	-	2
Youth Groups (Camping and Sports)	3	4
Land Use for Municipal Purposes	8	8
Land Use for Government Purposes	9	11
Miscellaneous	31	20
	96	91
Hay Permits		
Number of Permits	17	15
Tonnes of Hay	244.45	227.49
Grazing Permits		
Number of Permits	3	3
Head of Livestock	60	60

Forestry Branch Organization Chart

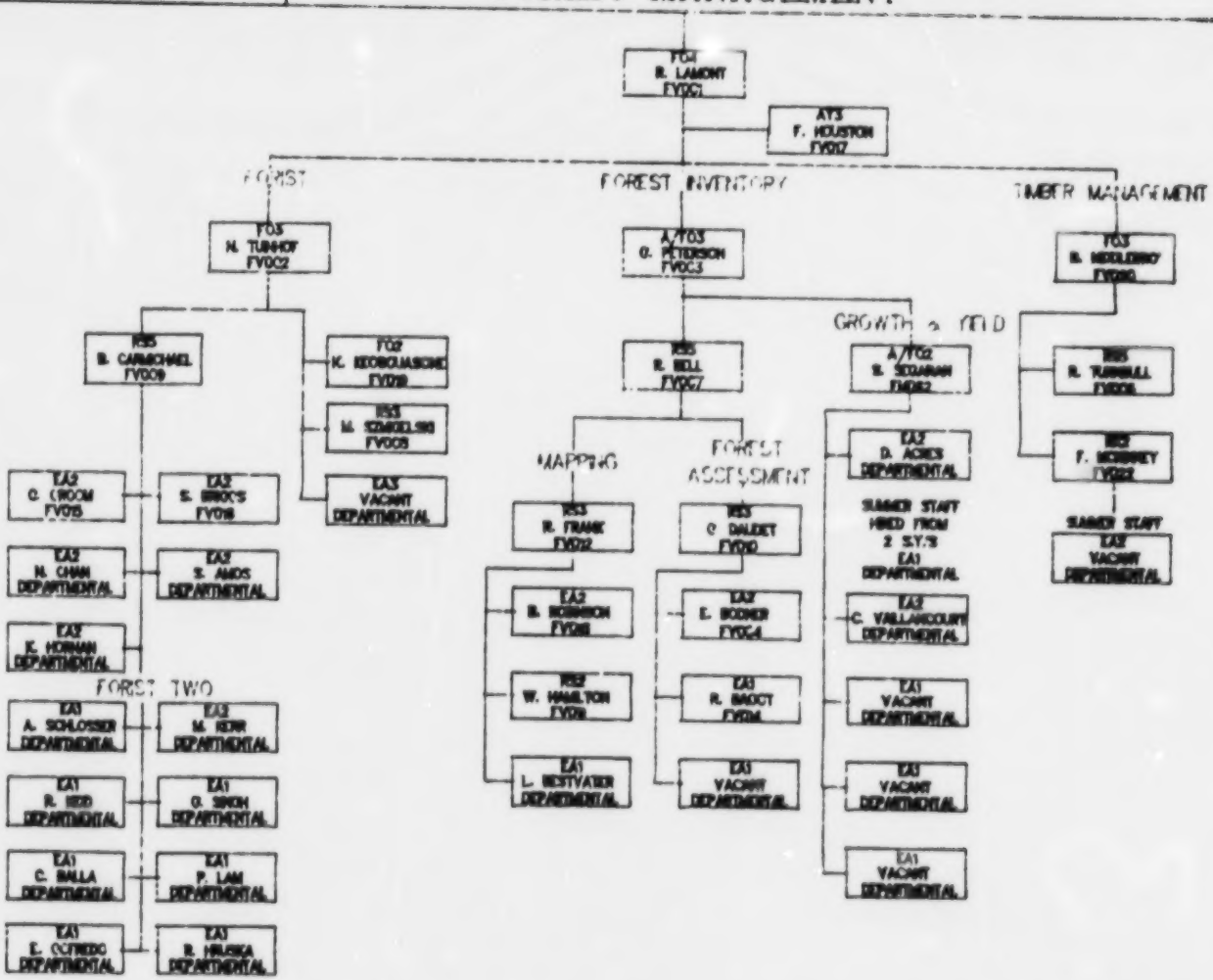


For further Organizational detail see following pages.

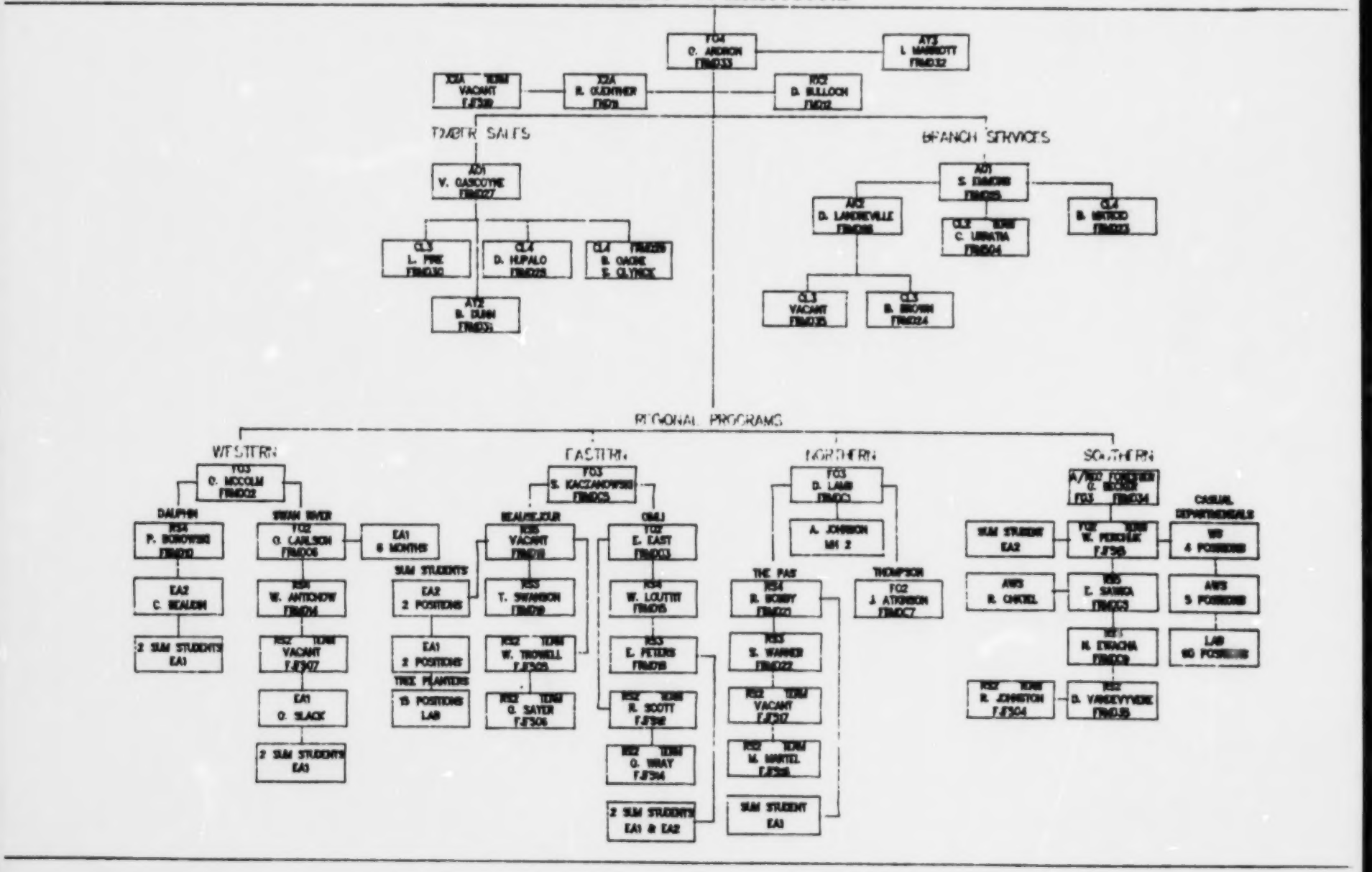
SILVICULTURE



FOREST MANAGEMENT



FOREST OPERATIONS



FOREST PROTECTION